COLLABORATIVE RESEARCH SURVEY ON MARINE FISHERIES RESOURCES AND ENVIRONMENT IN THE GULF OF THAILAND 2018

Metal composition of aerosol over the Gulf of Thailand during 2018 southwest monsoon

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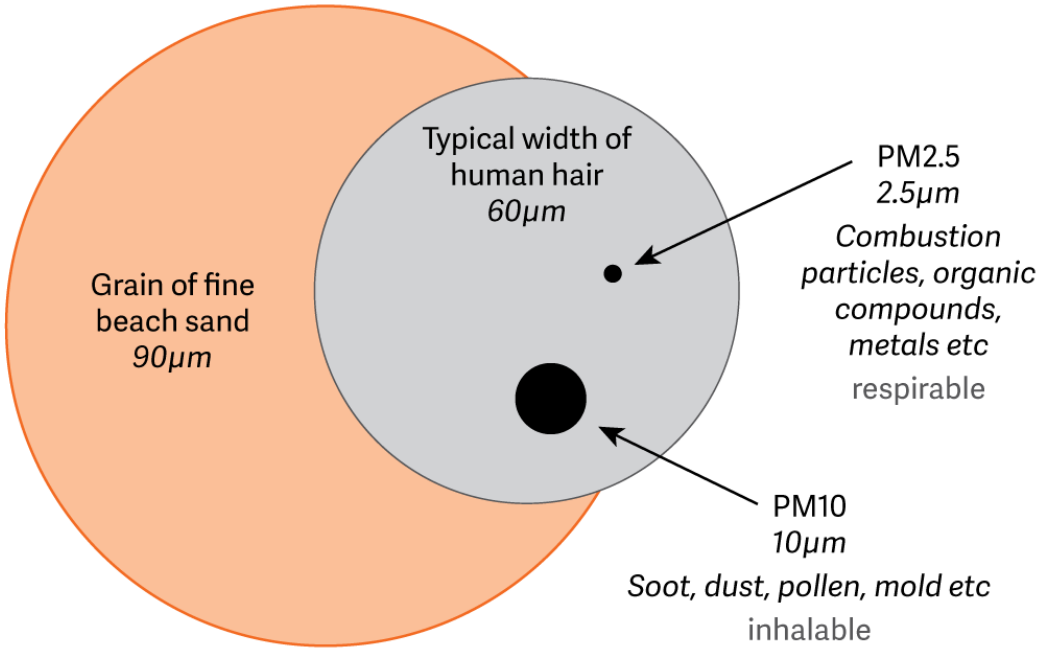
AEROSOL

Suspended particle of liquid or solid in the atmosphere

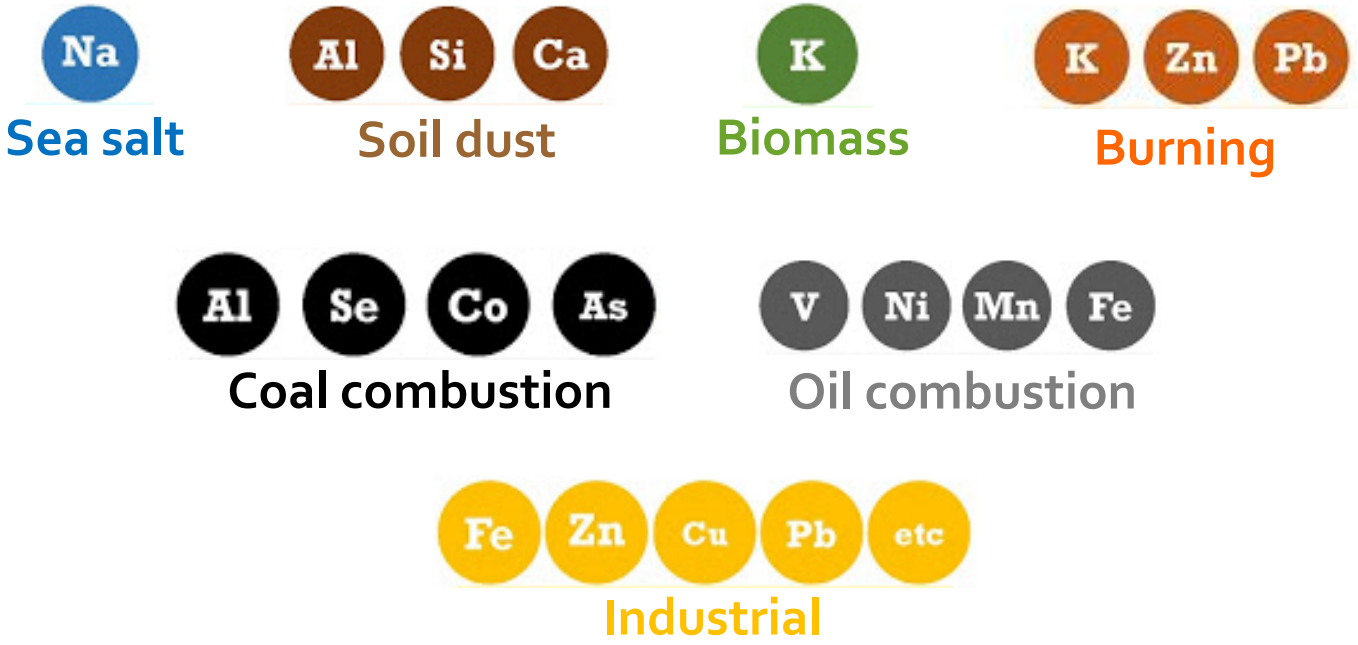
- $PM_{2.5}$ → particulate matter less than 2.5 μm
- PM_{10} → particulate matter less than 10 μm



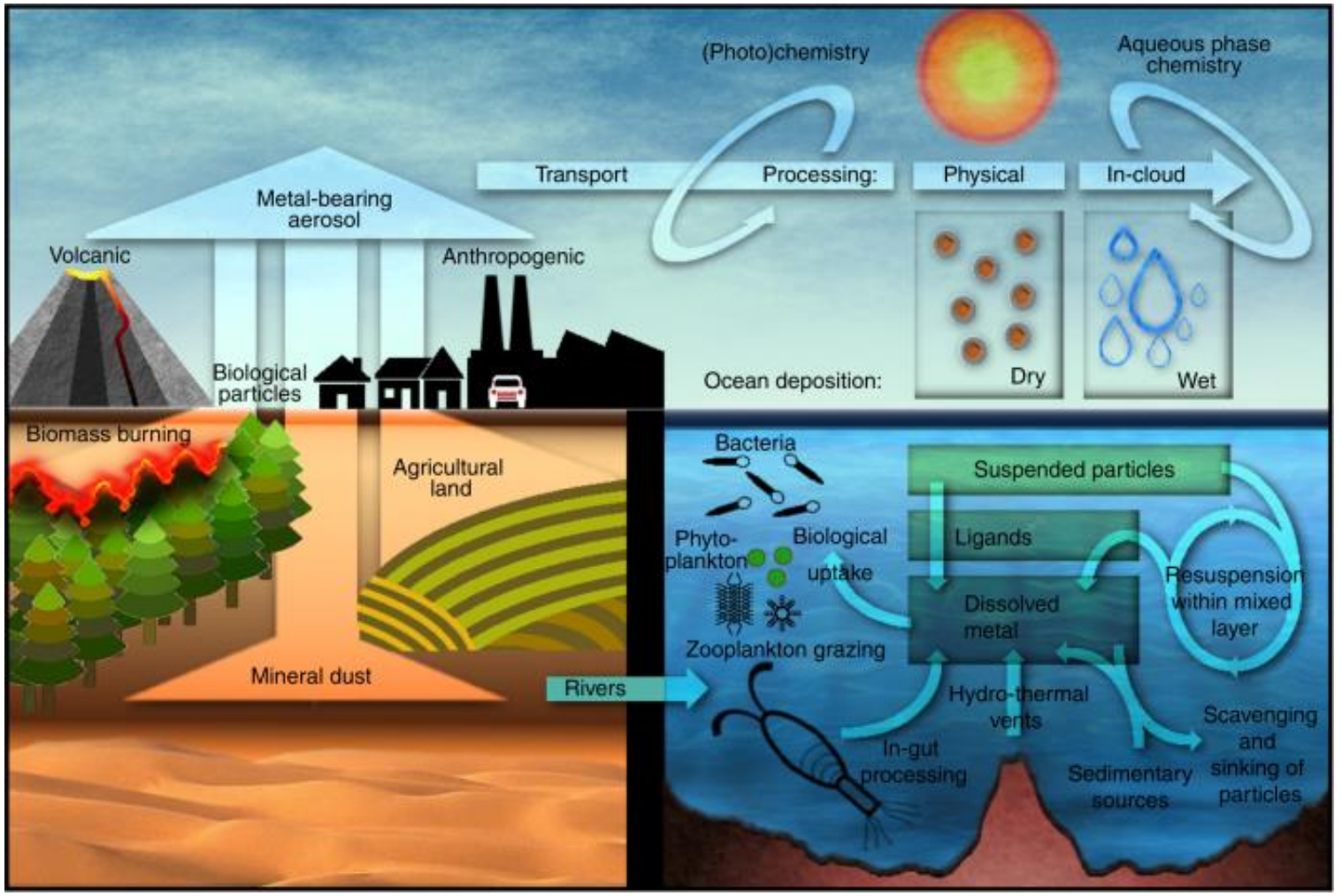
https://www.grida.no/resources/8282

$PM_{2.5}$-METALS

- Effect to human health and marine organisms
- Vary at different locations, times and weather condition



IMPACT ON THE OCEAN



Aerosol trace metal leaching and impacts on marine microorganisms (Mahowald et al., 2018)

SAMPLING

Impactor

$PM_{10-2.5}$

$PM_{2.5}$

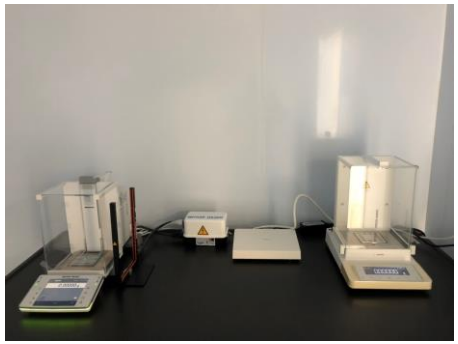
Rain cover

- Collecting $PM_{10-2.5}$ and $PM_{2.5}$ from the Gulf of Thailand (SEAFDEC2) on 12 August to 20 September 2018 (southwest monsoon)
- Flow rate 10-15 L/min

METAL ANALYSIS

EARTH OBSERVATORY OF SINGAPORE

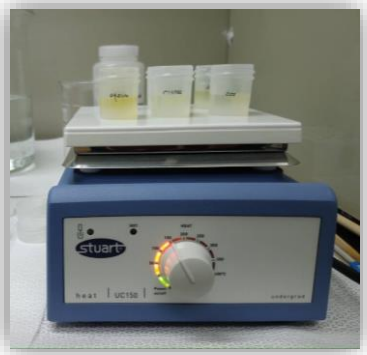
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE



https://earthobservatory.sg/facilities/metal-free-chemistry-clean-room

METAL ANALYSIS

Filter



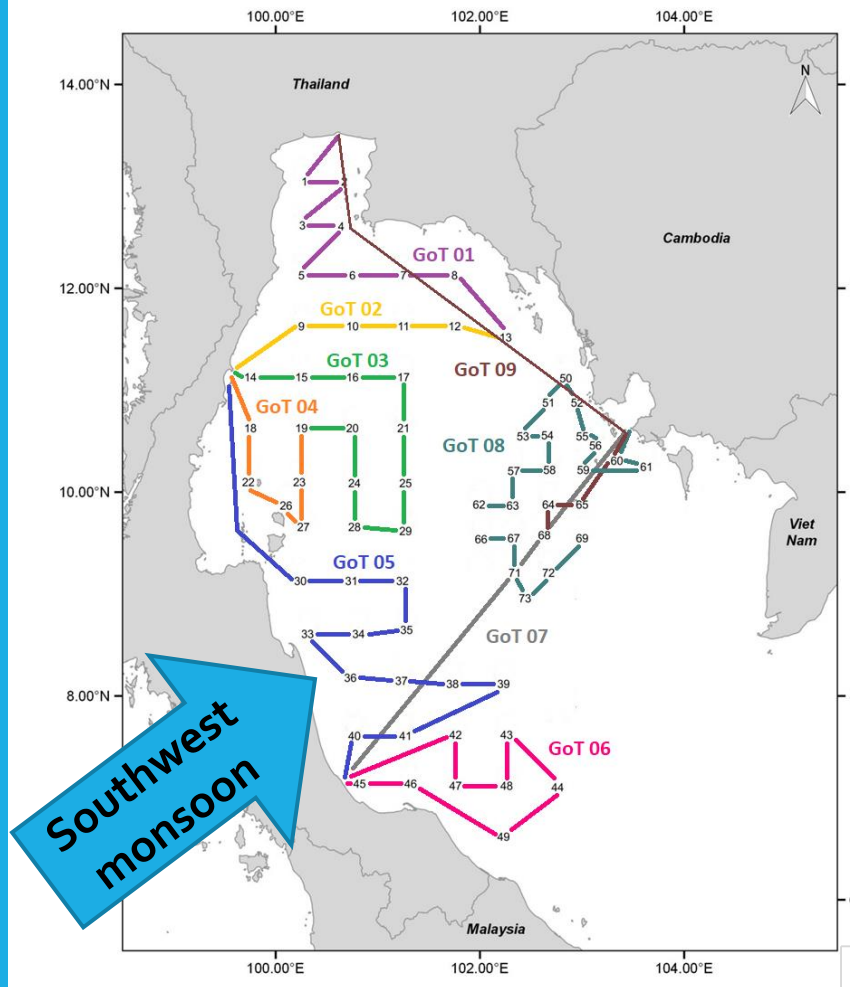
Strong acid leaching of filters to extract metals

Metal analysis using ICP MS (Thermo Element II)

15 metals

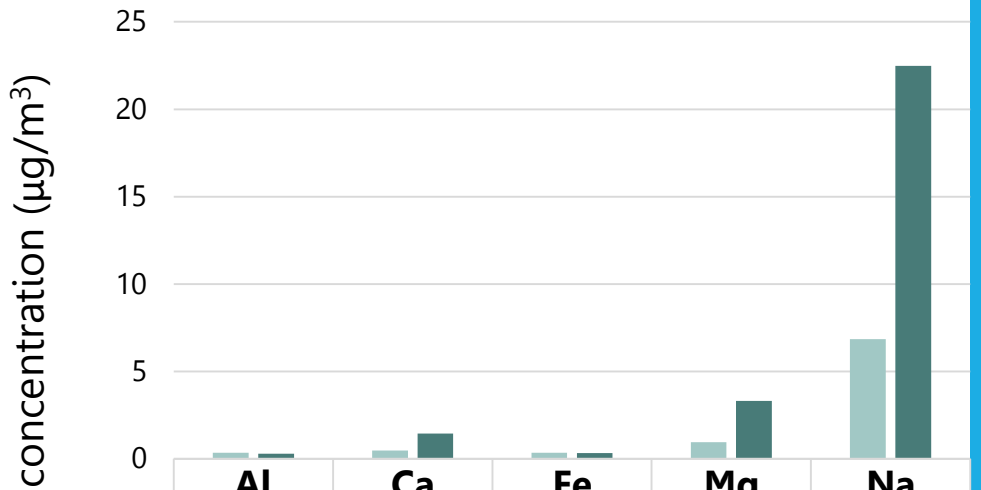
Low range; Ba, Cu, Cr, Mn, Ni, Pb, Sr, V, Zn and As
High range; **Al, Ca, Fe, Mg, and Na**

METAL CONCENTRATION



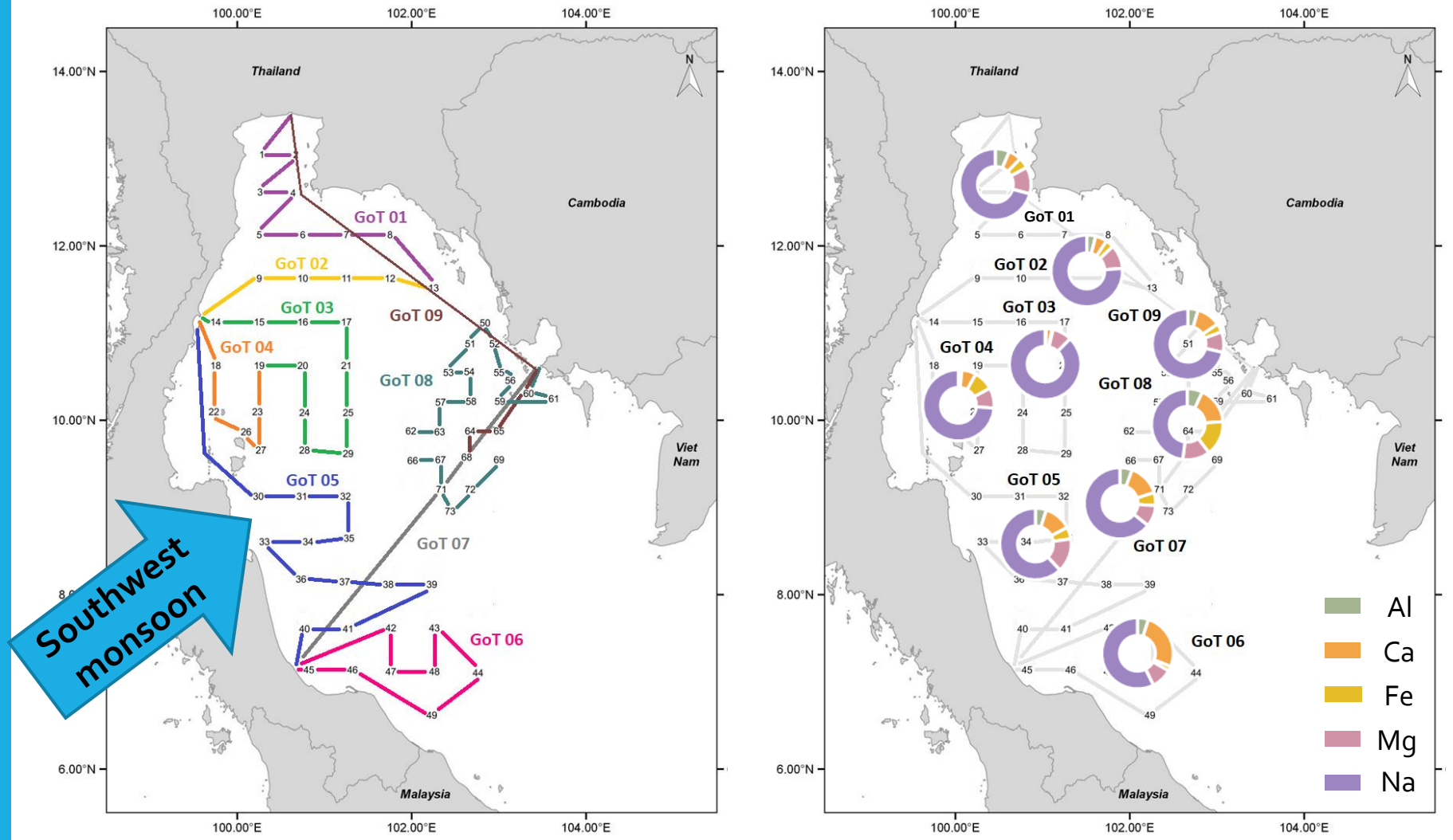
High concentration

- PM 2.5 – 10, Marine source (Na, Mg and Ca)
- Major Ion from continental crust; Al and Fe (both particle size)

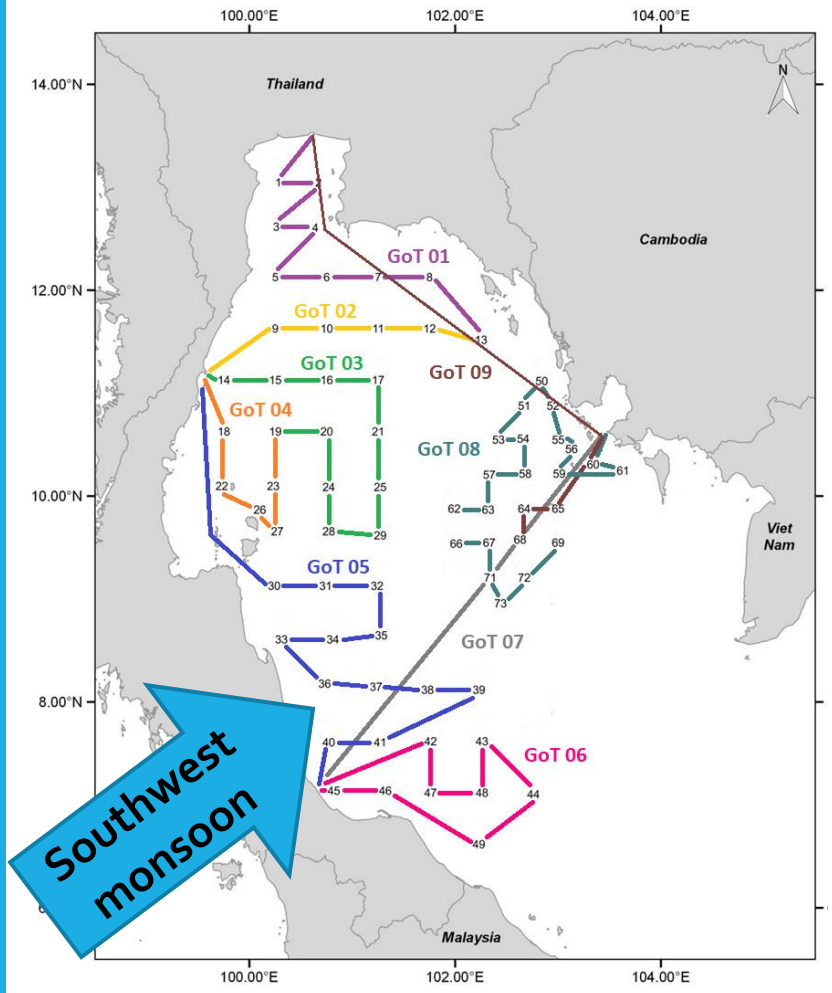


	Al	Ca	Fe	Mg	Na
PM2.5	0.346	0.485	0.348	0.961	6.844
PM10-2.5	0.293	1.451	0.333	3.315	22.483

MAJOR METAL in $PM_{2.5}$(%)

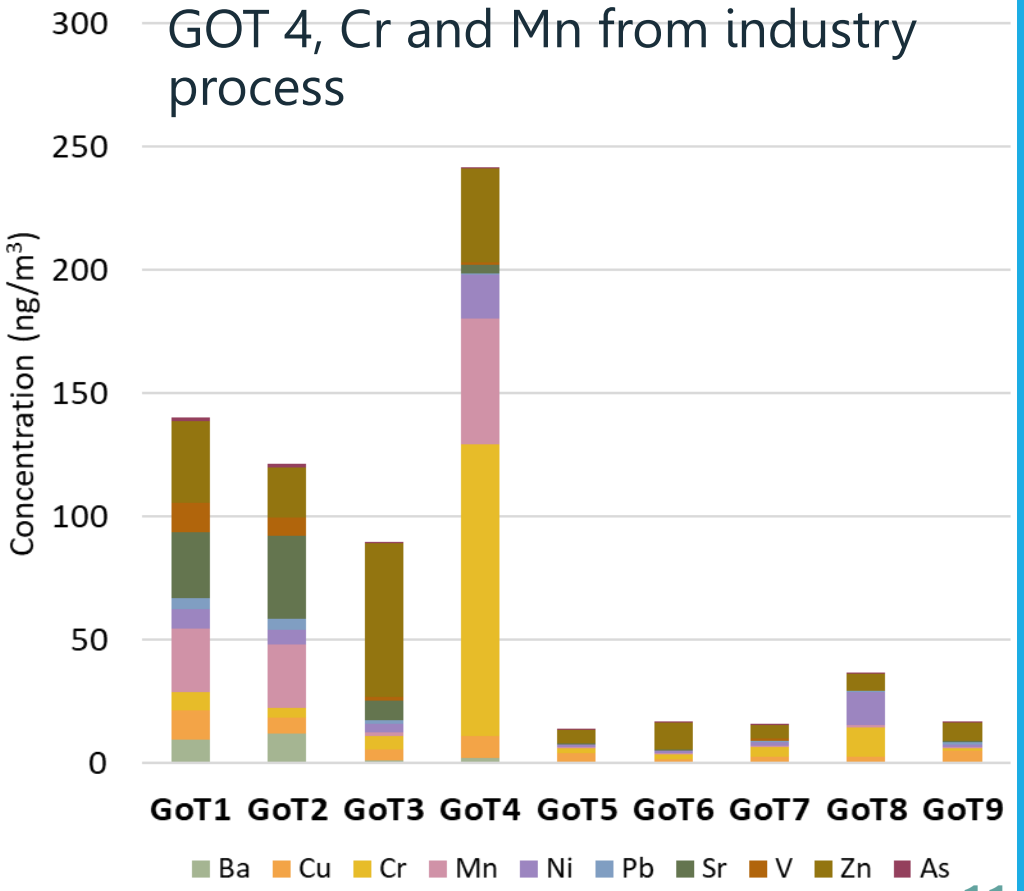


TRACE METAL – $PM_{2.5}$



GOT 1 to 4, displayed high metal conc. from continental influence difference from GOT 5 to 9

GOT 4, Cr and Mn from industry process



CONCLUSION

- The upper Gulf of Thailand and coastal samples were indicated high concentrations of continental aerosol such as Al and Fe
- Ca, Mg, and Na represent sea spray aerosol and high concentrations in $PM_{10-2.5}$
- The air masses originate in the South China Sea and touches the southern tip of Vietnam before reaching
- GoT 8 chemical composition differ from other samples due to air mass direction
- GoT 1-4 show high concentrations of metals
- Cr and Mn in GoT 4 probably from industrial processes





SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
FISHING WORKSHOP












6th
13th
15th
9th
8th
7th
11th
10th
5th
4th
3rd
2nd
1st